



**MISSOURI DEPARTMENT OF TRANSPORTATION  
MATERIALS ENGINEERING  
Jefferson City, Missouri**

**Test Method  
MoDOT T56  
DETERMINATION OF SODIUM METASILICATE ( $\text{Na}_2\text{SiO}_3$ )**

**1.0 Scope.** This method describes a procedure for determining the percent of anhydrous Sodium Metasilicate in automotive antifreeze by Atomic Absorption Spectrophotometry.

**2.0 Reagents and Apparatus.**

**2.1** An Atomic Absorption Spectrophotometer.

**2.2** Potassium Chloride (KCl), Reagent Grade.

**2.3** Ethylene Glycol, Reagent Grade.

**2.4** Silicon Standard Solution, 1000 ppm. This solution can be purchased from a number of sources.

**3.0 Preparation of Standard Solutions.**

**3.1** 10,000 ppm Potassium Stock Solution: Weigh 19.068 g of dried, reagent grade KCl into a 1000-mL volumetric flask, dissolve, and dilute to volume with distilled water.

**3.2** 0.152%  $\text{Na}_2\text{SiO}_3$  Standard: Pipette a 20-mL aliquot of 10,000 ppm K stock solution and a 7-mL aliquot of 1000 ppm Si standard solution into a 200-mL volumetric flask. Add 20.00 g of reagent grade ethylene glycol and dilute to volume with distilled water.

**3.3** 0.109%  $\text{Na}_2\text{SiO}_3$  Standard: Pipette a 20-mL aliquot of 10,000 ppm K stock solution and a 5-mL aliquot of 1000 ppm Si standard solution into a 200-mL volumetric flask. Add 20.00 g of reagent grade ethylene glycol and dilute to volume with distilled water.

**3.4** Blank Solution: Pipette a 10-mL aliquot of 10,000 ppm K stock solution into a 100-mL volumetric flask. Add 10.00 g of reagent grade ethylene glycol and dilute to volume with distilled water.



**4.0 Procedure.** Weigh, to the nearest 0.1 mg,  $10 \pm 0.05$  g antifreeze into a 100-mL volumetric flask. Pipette a 10-mL aliquot of 10,000 ppm K stock solution into the volumetric flask and dilute to volume with distilled water.

Calibrate the instrument with the blank solution, the 0.109%  $\text{Na}_2\text{SiO}_3$  solution and the 0.152%  $\text{Na}_2\text{SiO}_3$  solution, then determine the concentration of the sample solution.

**5.0 Calculation and Report.** The method of calculating the % sodium metasilicate will vary according to the make and model of instrument used.

Report the results to the nearest 0.01%  $\text{Na}_2\text{SiO}_3$  as follows:

% Sodium Metasilicate ( $\text{Na}_2\text{SiO}_3$ ), anhydrous